EXPANDED EDITION

THE LIFE CYCLE OF WEALTH™

DECISION-MAKING THROUGH FOUR PHASES OF LIFE

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Optimizing Your Assets

The purpose of financial planning is to the support the achievement of life goals. The purpose of the balance sheet – a summary of what is owned and what is owed - then, is to support those plans. Importantly, our portfolios represent just one type of asset on the balance sheet – investable assets. These assets are distinct from personal and real property in that they are usually liquid (accessible), because they are priced according to the market for those financial assets (stocks, bonds, funds, etc.). As such, our portfolios change in value and a risk-reward analysis of these holdings becomes necessary. In purely investment terms, this analysis can occur at various levels: individual holdings, groups of holdings, accounts, or the overall portfolio.

Much of the last 100 years of academic and professional discussions about investing have focused on holdings, fees, and returns – and usually not in context of a comprehensive (i.e., strategic) financial plan. Planning-driven portfolio analysis treats portfolio assets asag part of an overall balance sheet designed to meet life goals. While holdings fees and return always matter to a point, such metrics still do not drive strategic decisions. Instead, planning-driven portfolio analysis necessarily focuses on the overall portfolio – the titling of assets, the choice of asset classes, the location of asset classes (across accounts), income tax consequences, beneficiary designations, and the like. As such, concepts discussed in this chapter focus on the aggregate portfolio, instead of individual holdings, various vehicles, or account types.

Portfolio management for planning purposes needs to seek *consistency of returns*. Seeking consistency means "tightening" the actual returns around the average – a concept known as Mean Variance Optimization (MVO). I often use the phrase *"not all 8% average returns are created*

equally." An average return of 8% (after all fees) is just that, an *average*. No one earns an annual 8%/year (after all fees) in a linear fashion, hitting 8% (after all fees) every year. Instead, actual annual returns fall along a scatterplot around the average and contribute to the average result. To achieve better consistency in the planning process, then, families must focus on achieving long-term average results wherein each set of annual returns is as close to the average as possible. Importantly, that average needs to be sufficient to meet the requirements of a comprehensive plan, while taking as little risk as possible.

Support for MVO

There is a relationship between portfolio optimization and goal attainment. In their study titled *Life Cycle Goal Achievement or Portfolio Volatility Reduction?* M A H Dempster, Dwayne Kloppers, Igor Osmolovskiy, Elena Medova, and Philipp Ustinov (2015) found that dynamic forms of portfolio optimization held advantages over other approaches with respect to goal attainment (p. 33). Separately, Alexander Izmailov and Brian Shay (2015) evaluated the effectiveness of Markowitz-based MVO techniques, and concluded that portfolio optimization has value when covariance is filtered. Izmailov and Shay did not, however, address goal attainment in their work (p. 4). Based upon these two studies, it appears that noise-filtered MVO techniques are valuable with respect to investment results (Izmailov and Shay, 2015), and that some forms of portfolio optimization (of which MVO is one), are correlated to goal attainment (Dempster, Kloppers, Osmolovskiy, Medova, and Ustinov, 2015).

Interestingly the latter study utilized gamma – a measure of increased wealth resulting from financial planning, from Blanchett & Kaplan's definitive study "Alpha, Beta, and Now… Gamma"

(2013). Specifically, the Demptster, Kloppers, Osmolovskiy, Medova and Ustinov study (2015) identified a correlation between portfolio optimization and gamma, where gamma is defined as increased wealth from planning. This finding supports the hypothesis that a positive correlation exists between portfolio optimization and goal attainment.

The Origins of MVO

In the 1950s, Professor Harry Markowitz of the City University of New York developed an approach to investment analysis that has become known as Modern Portfolio Theory (MPT). Instead of traditional asset management using just fundamental or technical analysis, his system looks at the performance of a portfolio of assets based on the combination of its components' risk and return. His hypothesis and subsequent work was so revolutionary that Markowitz was a joint Nobel Laureate for economics in 1990. Markowitz' "Efficiency Frontier", and the resulting Capital Asset Pricing Model (CAPM), made it possible to determine whether a portfolio is optimal in its risk/reward characteristics or not. Markowitz referred to this determination as Mean Variance Optimization (MVO).

Although the objective for MVO is clear, a universal method of measuring MVO is underdeveloped. This writing suggests the following MVO process: managing, optimizing, and measuring the aggregate portfolio. The aggregate portfolio is the entirety of a family's investable assets – across accounts. Once accounts are viewed together as a single investment plan, covariance analysis can occur.

Covariance and MVO

Covariance is the measurement of the extent to which two holdings vary together. Holdings could be individual securities or packaged holdings like mutual funds or Exchange-Traded Funds (ETF's). The objective of covariance analysis is to lower covariance among asset classes, giving no preference to the merits of any specific holding(s). Lowering covariance means investing in low-correlated asset classes that "offset" the risk in other asset classes. To execute covariance analysis, each holding in each account is identified as part of a specific asset class (e.g., emerging market stocks, domestic high-quality bonds, U.S. small cap stocks), and a correlation matrix is developed (to maintain technical accuracy, a covariance analysis consists of multiple calculations that support the correlation matrix, but the correlation matrix can be the result). The correlation matrix, in turn, identifies which asset classes can be maintained, increased, or decreased. The resulting lower-correlated asset class mix becomes the optimal mix.

Portfolio Construction and MVO

If the overriding goal of portfolio construction is to carry out the proper allocation to meet the risk/reward expectations of the family, and the optimal mix of classes has been determined, then only 2 questions remain: 1) should the family follow an indexed investment approach, or an actively-managed approach to each asset class? and 2) if actively managed, who should manage those assets? The answers to those questions lie in the measurement of MVO and are addressed later in this chapter. For now, we know anecdotally that a well-constructed portfolio (with relatively low covariance among asset classes), should render a risk-adjusted result that is preferable to the alternative: an asset base that is not built with optimization in mind. This truth is evident in a review of a portfolio's aggregate Sharpe Ratio. Developed by William Sharpe in 1966, a low or negative Sharpe Ratio (net of fees) indicates that a portfolio is performing below

expectations on a risk-adjusted basis, while a positive Sharpe Ratio (net of fees) indicates outperformance. Think of Sharpe Ratio as a return premium or discount for total risk taken. It answers the question: *"did the family receive any excess reward for the risk taken?"*

The Sharpe Ratio is calculated as follows:

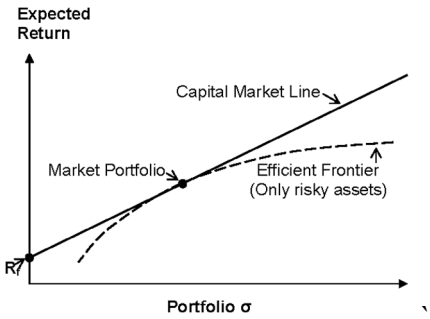
$$\text{Sharpe} = \frac{mean(R_{0..n} - B)}{std(R_{0..n} - B)}$$

Where:

$R_{0..n}$ Annualized returns over the period
B Risk-free rate of return

Recognizing the value of *aggregate** Sharpe Ratio is the first step to developing an MVO measurement model, because a Sharpe Ratio does not just compare a set of holdings to an index in an attempt to isolate market-based return (Alpha) or market-based risk (Beta, aka volatility). Instead, Sharpe Ratio accounts for the total risk taken (market and business risk combined, or "standard deviation" in technical terms) for the return achieved. Integrating risk and reward, Sharpe Ratio provides a more complete method of comparing two separate sets of holdings to each other, or a set of holdings to relevant indexes. Although William Sharpe originally created his formula for security-level analysis, not aggregate analysis, Sharpe Ratios can still quantify the risk/reward characteristics of their aggregate portfolio with relevant indexes, by comparing the Sharpe Ratios of the portfolio to that of the index.

The indexes or "market return" can be measured according to the Capital Market Line (CML), which is calculated as follows:



$$r_p = r_f + \sigma_p \left(\frac{r_m - r_f}{\sigma_m} \right)$$

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**Aggregate and account-level Sharpe Ratios are rarely the same*

Measuring Aggregate MVO

It follows from a portfolio-to-market Sharpe Ratio comparison, that any formula for measuring Aggregate MVO should quantify the success or failure of achieving this risk-adjusted (net of fees) outperformance. Further, the MVO measurement should attribute any outperformance to the asset classes involved. Finally, the measurement should attribute any outperformance to the holdings within each asset class. This final point is the crux of long-standing debate regarding active vs. passive (index) investing.

Recall that using Sharpe Ratios can provide a complete view of total risk/reward for a portfolio – that is risk/reward measurement encompassing diversifiable (aka "business" or "unsystematic") risk, and non-diversifiable (aka "market" or "systematic") risk/reward, the latter of which is often measured against a relevant benchmark, using Beta/Alpha. The distinction between total

risk/reward measurement and market risk/reward measurement is especially clear when asset prices fall (1973-1974, 1987, 1991, 2000-2002, 2007-2009, etc.), with entire asset classes (and their benchmarks) in flux. Therefore, using market-based measurements of risk/reward – particularly when discussing aggregate portfolios – is at best a volatile proposition. By contrast, employing Sharpe Ratio to measure an aggregate portfolio can be effective when comparing to the Sharpe Ratio of a relevant (strongly and positively correlated) benchmark. Importantly, the comparison between two Sharpe Ratios does not mean comparing the portfolio to the benchmark directly. Consider these examples – stories of families who have undergone an MVO process, and their results.

Case Study #1: A Tale of Two Portfolios

Portfolio 1 –Tom and Sally. During one recent engagement, our firm provided analysis for approximately $3 million of investable assets. The families involved were convinced their holdings were strong, having generated consistent double-digit returns over the recent 5-year period measured. They were right. Based upon a rolling 5-year history, as of June 30, 2015, their portfolio results according to Morningstar were as follows:

Risk and Return Statistics	5 Yr.	
As of Date 6/30/2015	Portfolio	Benchmark
Standard Deviation	10.04	5.42
Mean Return	11.42	7.04
Sharpe Ratio	1.12	1.27

All data provided by Morningstar, Inc.

What do we know from this analysis? We know that Tom and Sally's 5-year historical Mean Return reported is substantially higher than the relevant benchmark return (using a benchmark with a correlation co-efficient of 85.14 over the same period). We also know that the portfolio variance (i.e., total risk) was substantially higher, based upon its Standard Deviation. The combination of these two points provides a return premium (or discount) for total risk taken – the Sharpe Ratio. Clearly, the risk premium achieved by Tom and Sally was inadequate compared to the Sharpe Ratio available to them in relevant areas of the marketplace. This is all helpful information for Sally and Tom, and provides evidence that risk is too high for the return achieved, when compared to other relevant options available to them. The argument for indexing stops here and asserts that Tom and Sally should "buy the relevant index" through low-cost investing and achieve the same total risk/reward as the benchmark itself. This method of improvement is both accurate and viable for Sally and Tom. However, it does little to explain the efficiency of their portfolio. Enter MVO scoring. MVO scoring measures the mean return of the aggregate portfolio based upon the risk taken. It answers the question: given the risk taken, did the overall portfolio perform as expected? Or, was it better/worse than expected? Further, an attribution analysis can identify the level of contribution each holding made to the overall score.

In our case study, Sally and Tom can now understand if their portfolio achieved better or worse than an aggregated portfolio risk/reward continuum known as the "Capital Market Line" (CML), and what adjustments can be made to optimize their assets. Tom and Sally's MVO Score was: (1.62) or -1.62. This score indicates the family's portfolio was less efficient when compared to the CML. Note that the CML represents the intersection of risk and reward, so itself is perfectly efficient (it cannot be more or less efficient than itself). We therefore assign the CML score an

MVO score of zero. As such, a relevant indexing strategy would carry a portfolio MVO score of zero, less the internal costs of the vehicle used (Mutual fund, ETF, etc.). In Sally and Tom's case, a negative MVO score indicates either excess risk, insufficient reward, or both. Other than investing their entire portfolio in an indexed fashion, what else can Sally and Tom do to achieve a more optimal aggregate portfolio? Let's look at another example.

Portfolio 2 – Mark and Sara. Another recent engagement our firm accepted included an MVO analysis for a family with approximately $4.5 million of investable assets, approximately $1.5 million of which was highly-concentrated stock in a U.S. blue-chip company. For comparison purposes, we will set aside this stock position, and focus on the other $3 million in assets. Like the previous case, the families were proud of the results of their holdings over the 5-year rolling period, as follows (according to Morningstar):

Risk and Return Statistics	5 Yr.	
As of Date 6/30/2015	Portfolio	Benchmark
Standard Deviation	7.45	5.42
Mean Return	10.47	7.04
Sharpe Ratio	1.37	1.27

All data provided by Morningstar, Inc.

In this case, the benchmark correlation coefficient was 89.11 over the period measured, indicating a strong positive correlation, and therefore a relevant comparison point. Once again, when the index itself is inserted into the CML formula will again render an MVO score of zero, being neither less efficient nor more efficient than itself. Sara and Mark's portfolio MVO score was the focus of this project and was: .79 or +.79. This score indicates the portfolio measured was superior over the period measured, when compared to the CML (previously defined as the intersection between

risk and reward for the entire portfolio). What does this mean for Mark and Sara? It means they received reward above the risk taken – at the aggregate level. How did they achieve this? The interactions between portfolio holdings (i.e., covariance) allowed them to "elevate" their results beyond that of the index or any individual holding. Not unlike a competent college basketball coach identifying which player(s) contribute to and detract from overall results (when viewing the overall team on the court), a competent portfolio manager can create a portfolio MVO attribution analysis, which measures the contribution of each asset class (and even each holding) to the overall MVO score and can thereby isolate and remove poor MVO contribution.

Scoring MVO

In conclusion, an MVO analysis can provide necessary insight into the assets in the portfolio mix, their interplay, and their combined efficiency. In the two cases discussed, both couples held different types of vehicles with different levels of underlying fees (advisory fees were not applied). Also, both couples felt confident with their results, and were generally comfortable with the direction of their asset base. The MVO scoring process gave both households an added dimension of clarity, and necessarily, a starting point from which to work with their advisors on the underlying cause of any inefficiency identified.

Regardless of who is managing your money, regardless of the overall fee structure, and regardless of whether indexing is deemed sufficient to optimizing assets, consider measuring the efficiency of the aggregate first. If you have an MVO score, you can better decide how to proceed with any remaining analysis. To appreciate the value of aggregate Mean Variance Optimization (MVO), the family must first recognize that a large majority of portfolio theory achievements relate to security-

level analysis, not portfolio-level analysis. These achievements include work by talented researchers and investors such as Benjamin Graham, Sir John Templeton, Warren Buffet, Kenneth French and Eugene Fama – all of whom focused their work on the analysis of individual holdings. One notable contrast to this group is the "Wizard of Wharton" – renowned professor Jeremy Siegel – who inches closer to measuring aggregate portfolios with a focus on asset class behavior. Siegel's work is primarily focused on areas of the marketplace compared to each other in terms of their risk/reward characteristics (e.g., stocks versus bonds versus gold). Despite the many achievements of all the individuals mentioned, there remains a shortage of information and practice around portfolio-level analysis. Importantly, this "aggregate" analysis is requisite to any portfolio supporting a family's financial plan or a company's strategic plan. Any technically-drafted financial or strategic plan relies on aggregate portfolio assumptions, for the plan to function as intended. Therefore, more precise assumptions mean greater predictability during the planning process, and often, better long-term funding for the plan.

In this chapter, we have intentionally bypassed portfolio diversification techniques, and treated portfolios as sufficiently diversified. That is, diversifiable (non-market) risk was assumed to be managed. Also, we assumed the portfolio was sufficiently correlated to its relevant indices (aka the "blended benchmark") and was therefore exhibiting risk/reward characteristics reflective of the blended benchmark. Further, we have implied (and will continue to assume) that the portfolio's total risks (i.e., non-market and market) are sufficiently managed. Recall that Parts II and III of this series suggested 1) using the standard deviation-based Sharpe Ratio to measure aggregate risk/reward, and 2) comparing the portfolio's Sharpe Ratio to that of the blended benchmark –

different from the direct portfolio-to-market comparison made with Alphas and Betas, related only to market risk.

The reason for assuming the portfolio is healthy overall? Good portfolio advice is readily available from technical advisors doing the hard work of portfolio construction, asset allocation, and asset location. After this work is complete, aggregate MVO can begin. The purpose of this edition of The Risk Manager is to provide a process for aggregate portfolio MVO, after traditional portfolio management techniques have been executed. To illustrate this optimization process, consider another recent case study that explains how aggregate MVO works.

Case Study #2 – Portfolio Optimization Project

Carrie was recently introduced to our firm, through her accounting office. Carrie is a wife, mother, and successful realtor in her early 50's. Throughout her career, Carrie has built a total portfolio of approximately $1 million across 7 total accounts. To begin the project, Carrie's portfolio was aggregated: the 7 accounts were combined, then measured against a relevant, blended benchmark for moderate families. Next, the aggregate results were compared to an optimized model for moderate families.

For Carrie's current portfolio*, the aggregated risk/reward data were as follows:

Risk and Return Statistics	5 Yr.	
As of Date 09/30/2015	Portfolio	Benchmark
Standard Deviation	7.72	7.57
Mean Return	6.84	6.52
Sharpe Ratio	0.89	0.87

All data provided by Morningstar, Inc.

For an optimized moderate model, the aggregated risk/reward data were as follows:

Risk and Return Statistics 5 Yr.		
As of Date 09/30/2015	Portfolio	Benchmark
Standard Deviation	6.62	7.57
Mean Return	7.66	6.52
Sharpe Ratio	1.14	0.87

All data provided by Morningstar, Inc.

**Advisory fees for the current portfolio were not available. All data are shown without the impact of advisory fees.*

Aggregate Risk/Reward Findings: we can observe from these data an Alpha of 1.27 and Beta of .85 (on an R-squared of 70.14) meaning Carrie's portfolio was well-diversified and achieved superior results when compared directly with the relevant, blended benchmark. Her 6.84%/year return versus the 6.52%/year return for the benchmark clearly demonstrates this reality and suggests that traditional portfolio management techniques have been implemented (either per account or on the aggregate, or both).

Optimization Findings: comparing the aggregate portfolio to an optimized model for the 5-year rolling period through 09/30/15, a different theme emerged. During the period, risk could have been slightly lower, and return slightly higher. Consequently, the Sharpe Ratio of .89 could have been 1.14, for a moderate family. Further, comparing the aggregate with an optimized model from a pure return standpoint, the portfolio lagged .82% per year. That's .82% per year – every year for 5 years - or 4.1% overall. For Carrie, this 4.1% on $1 million invested (assuming a constant value) totaled approximately $41,000 in lost opportunity.

Unfortunately, many families will continue to miss the opportunity to aggregate and optimize their portfolios, often to the detriment of their overall plans. In fact, the planning conversation quickly devolves into a portfolio management discussion, focused on modular (investment-only) issues:

- What was the risk/return of just one asset class?
- What benchmark should I use to measure that asset class?
- How did my vehicle(s) compare to that benchmark?

Fortunately, the processes for portfolio aggregation and optimization can be very straightforward. In as little as a few hours, the portfolio can become "one" investment plan. By addressing these topics, families are given holding, product or vehicle references that can be used in making investment-only decisions (and not at the aggregate level). While engaging in modular investment analysis is not necessarily a fruitless effort, it just does not qualify as the aggregate investment analysis requisite to comprehensive planning.

Here are the suggested steps for aggregate analysis in support of financial planning:

Portfolio Aggregation Steps.

1. Gather statements showing holdings and quantities (shares or units) of holdings
2. Integrate the holdings and quantities
3. Evaluate the correlation among holdings
4. Compare the aggregate data to a relevant, blended benchmark

Portfolio Optimization Steps

1. Measuring aggregate risk/reward against optimized models
2. Adjusting the portfolio accordingly

At the beginning of this chapter, it was stated that investable assets 1) are part of a family's balance sheet, and 2) need to be managed for consistency of returns in the context of comprehensive planning. Further, this chapter has proposed that an aggregate portfolio can be measured with respect to its optimization. Given a current dearth of research in portfolio-level MVO measurement, the only interim answer to optimizing an entire portfolio is to approach the measurement process systematically. To begin, the family and/or professional advisor(s) need to aggregate. Then the aggregate portfolio can be optimized and adjusted as needed. Without aggregation and optimization, the family may be completely unaware of the substantial missed opportunity to add value to a comprehensive financial plan. Far worse, the comprehensive plan may suffer from invalid assumptions, a lack of long-term funding, or both.


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